

**Highways Department  
Hong Kong Government**

**Agreement No. CE 22/97  
Route 9 between Tsing Yi  
and Cheung Sha Wan  
Detailed Feasibility Study**

**Environmental Monitoring and Audit Manual**

**August 1999**

***Atkins China Ltd***

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**ABBREVIATIONS**

AL	Action/limit
APCO	Air Pollution control Ordinance
AQO	Air Quality Objective
CNP	Construction Noise Permit
CT8	Container Terminal 8
CT9	Container Terminal 9
DGs	Dangerous Goods
EIA	Environmental Impact Assessment
EIAO	Environmental Impact Assessment Ordinance
EL	Independent Monitoring Team Leader
EM & A	Environmental Monitoring and Audit
EPD	Environmental Protection Department
ER	Engineer's Representative
ET	Environmental Monitoring Team
HKPSG	Hong Kong Planning Standards and Guidelines
HVS	High Volume Sampler
HyD	Highways Department
LAR	Lantau Airport Railway
LPG	Liquefied Petroleum Gas
NCO	Noise Control Ordinance
NSR	Noise Sensitive Receiver
NWT	Nam Wan Tunnel
ODP	Outline Development Plan
PHI	Potentially Hazardous Installation
R16	Route 16
R3	Route 3
R9	Route 9
SR	Sensitive Receiver
TDD	Territory Development Department
TM	Technical Memorandum
TSP	Total Suspended Particulates
TYTC	Hong Kong Technical College (Tsing Yi)
USAEPA	United States of America Environmental Protection Agency
WDO	Waste Disposal Ordinance
WKH	West Kowloon Highway
WKR	West Kowloon Reclamation
WPCO	Water Pollution Control Ordinance

## 1. INTRODUCTION

Atkins China Ltd were appointed by Highways Department of the Government of Hong Kong Special Administrative Region to carry out a detailed feasibility study of Route 9 (R9 DFS) between Tsing Yi and Cheung Sha Wan.

### 1.1 Purpose of the Manual

1.1.1 The purpose of this Environmental Monitoring & Audit (EM&A) Manual is to guide the EM&A programme for the Route 9 (R9) Project between Tsing Yi and Cheung Sha Wan to ensure compliance with the Environmental Impact Assessment (EIA) Report. The recommendations of the EIA Report were endorsed by the Project Steering Committee in May 1998. This is subject to approval of the EIA Report under the statutory procedures of the EIAO and supporting Technical Memorandum. The EIA recommends procedures to:

- ensure that any environmental impacts resulting from the construction and operation of the R9 are minimised or kept to acceptable levels;
- establish procedures for checking that mitigation measures have been applied and are effective, and that the appropriate corrective actions are undertaken, if and when required; and
- provide a means of checking compliance with environmental objectives, recording anomalies and documenting corrective action.

1.1.2 This Manual contains the following:

- information on the R9 project, the project organisation and construction programme;
- general EM&A principles and the EM&A team organisation;
- monitoring parameters, schedules, Action/Limit Levels and action plans;
- complaints procedures; and
- reporting procedures.

1.1.3 The Manual serves a dual purpose:

- Identifying the duties and responsibilities of an independent environmental team, which will be required to carry out the monitoring, audit and reporting procedures specified in this manual.
- The Manual sets out the basic requirements to be incorporated into the works contract, and contains specific actions required to be performed by the Contractor.

### 1.2 Project Description

#### *Background*

1.2.1 R9 will take approximately five years to construct with completion currently planned for Autumn 2006. Viaducts will run from Lai Wan Interchange connecting with Route 16 (R16) and the West Kowloon Highway (WKH) near Cheung Sha Wan in the east, across the northern section of the West Kowloon Reclamation (WKR), between Container Terminal 8 (CT8) and Stonecutters Base to the Stonecutters Bridge which will span across the Rambler Channel between CT8 and Container Terminal 9 (CT9). Viaducts will link the bridge to CT9 and the main carriageway will continue through Tsing Yi Island via the dual three lane Nam Wan tunnel (NWT). From the western

portal of the NWT, viaducts will link R9 to the Cheung Tsing Highway. The Project alignment is shown in Figure 1.1. Construction will require work areas either side of the alignment and there will be determined in detail later.

- 1.2.2 The alignment is predominantly directed through non-sensitive areas or established transport corridors and few sensitive receivers (residential, hospital or schools) are likely to be affected by the works. Whereas the alignment presents few environmental concerns that are likely to result in fundamental changes to the design, there are existing and planned sensitive receivers potentially affected by the Project. The potentially affected land-uses include those described in the Environment Chapter of the Hong Kong Planning Standards and Guidelines (HKPSG). The existing and planned sensitive receivers are reviewed below, working along the alignment from the west (Tsing Yi) to the east (West Kowloon).
- 1.2.3 The western extremity R9 will dove tail with R3. There are few sensitive receivers (SRs) in close proximity to the works and the nearest residential apartments are at Ching Wah Court, Tsing Chin Street. A school is also located on the junction of Tsing Yi Road and Ching Hong Road. All the above SRs are more than 300m from the main R9 alignment. The western portal of the Nam Wan Tunnel and some of the construction works for the linking viaducts to R3 would have line of sight to approximately the top six floors of Ching Wah Court, the lower floors and school adjacent to the downslope of Tsing Yi Road are well shielded from the works, as are all other developments on Ching Hong Road.
- 1.2.4 Nam Wan Tunnel will convey traffic on R9 to and from the eastern side of Tsing Yi. Ecological impacts at the portals have been considered.
- 1.2.5 The east end of the Nam Wan Tunnel will emerge through a portal which will be over 1.5km from the Vocational Training Council's Hong Kong Technical College (Tsing Yi) (TYTC) and Mayfair Gardens. These sensitive receivers are more than 300m from the main R9 alignment but within 300m of the proposed link from R9 to CT9. These receivers are well away from the R9 main alignment but they may be affected by the local roads and the R9 link roads.
- 1.2.6 The supporting structures (anchor blocks) for the Stonecutters Bridge are currently planned to be built within CT9 (CT8 is completed in this respect) and hence no additional reclamation is required. The R9 consultants in liaison with the CT9 consortium/consultants will determine the detailed requirements of the advance works to enable CT9 reclamation works in the vicinity of the anchor block to proceed in a timely manner. Since no additional reclamation is required water quality impacts would be confined to any construction site liquid wastes or runoff.
- 1.2.7 There are no schools, hospitals or domestic sensitive receivers in the vicinity of the viaduct section as it traverses the northern edges of Stonecutters Island but there are several dwellings within the Stonecutters Base compound. These dwellings were formerly used by military forces as weekend retreats and married quarters. At this stage it has not been possible to rule out that these dwellings are used for residential purposes, therefore they are included as SRs in the assessment.
- 1.2.8 Further south at the eastern side of the WKH, West Rail and LAR, several sites in the northern area of the West Kowloon Reclamation have been proposed for residential development. The nearest of these sites have been identified as Sites 10 and 6 in the

recent Review of Land Use in Northern Part of the West Kowloon Reclamation study by TDD. The link from R9 southbound to the WKH will pass very close to site 10 and nearer to Site 6 than the WKH.

### 1.3 EIA Requirements

1.3.1 The EIA Report recommended a range of mitigation measures to control the Project's potential environmental impacts with regard to potential dust, marine water quality and noise impacts. The schedule of mitigation measures is provided in Section 9 of this Manual.

### 1.4 Project Organisation

1.4.1 The current practice is for an Environmental Monitoring Team to be employed specifically for the project, objectivity for monitoring is the key requirement.

1.4.2 The duties to be undertaken by the Environmental Team (ET) comprise the following:

- To monitor the various environmental parameters as required in the EIA study final report.
- To investigate and check the Contractor's equipment and work methodologies with respect to pollution control and environmental mitigation, and anticipate environmental issues for proactive action before problems arise.
- To ensure implementation of the measures as laid down in the EIA

1.4.3 To carry out the above duties, the team will be made up of appropriate professional and technical staff as follows:

- Environmental Team Leader (TL), supported by other team members, should be an Environmental Consultant with over fifteen years experience in environmental management and planning. Extensive knowledge of the study area is required. The TL should have work experience in Hong Kong managing and providing specialist advice on environmental monitoring of infrastructure projects.
- Supporting the Team Leader will be leaders for the different fields such as air, water and noise. The staff will have over six years experience working in appropriate fields of environmental projects in Hong Kong with skills in the use of computer models, database design and management of monitoring programmes. Experience in dealing with contractors directly is required.
- The detailed monitoring work will be carried out by staff with a minimum of 1 year of technical experience in an environmental field, such as water quality monitoring, analysis and assessment, air and noise monitoring, modelling and analysis, and scoping exercises to identify key environmental issues. They will be experienced in conducting on-site monitoring, data-gathering and subsequent computer-modelling data analyses.

1.4.4 The quality of the work produced by the TL will be audited by an Independent Checker (Environmental) who is expected to have a similar level of experience as the TL. The main role will be to:

- To audit and prepare audit reports on the environmental monitoring data and the site environmental conditions.



- To report on the environmental monitoring and audit results to the ER.
- 1.4.5 Appropriate resources shall be allocated by the ET to fulfil their duties specified in this manual.
- 1.4.6 The Environmental Works checker (or checking team) will have a similar level of experience as the ET.

## 1.5 Construction Works and Programme

1.5.1 The construction works for the Project include:

- The construction phase of R9 will occur over a period of 5 years and will have impacts with respect to air pollution, noise, visual aspects, water pollution.
- The overall construction programme for R9 will be phased over a period of four and a half years. A preliminary construction programme has been developed. Completion is currently anticipated for August 2006.
- A bridge will be constructed over the Rambler Channel from CT8 to CT9. Viaducts will be constructed.
- The overall construction period for the viaducts is anticipated to be from 2002 to 2006.
- The overall construction period for the Stonecutters Bridge shall be from 2002/3 to 2006/7.

## 1.6 Construction Methods for Viaducts

### *Viaducts - Land Piles*

- 1.6.1 Machine bored piles are required and it is anticipated that these will be constructed using either an auger or a reverse circulation drilling rig.
- 1.6.2 Pile load tests will be carried out on certain piles.

### *Pile Cap and Pier Construction*

- 1.6.3 Standard methods will be used for pile cap and pier construction with the concrete delivered by agitator/mixer trucks and placed by chute, skip, trunking or pump. The concrete will be compacted by vibrators. Backhoes will be used for excavation of the pile caps.

### *Deck Construction*

- 1.6.4 It is anticipated that decks will be erected by balanced cantilever construction / launched girder, for the decks over the piers.
- 1.6.5 For the purpose of the exercise it has been assumed that a launching girder will be used and the time to construct the 2.5km of viaduct will take 36 months. On this basis the deck construction (i.e. concreting works) should commence in March 2003 and be completed in March 2006.
- 1.6.6 Precast segmental balanced cantilever erection methods will be used. A launching girder of approximately 133m long will be assembled and supported onto two temporary piers for segment erection. This launching girder will be equipped with one

front leg, one rear leg, one front pylon, one rear pylon and two lifting gantries. By means of re-positioning of the legs and pylons, the girder can travel forward, backward and transversely.

- 1.6.7 Segments will either be lifted in pairs or individually in accordance with the erection procedures. Segments will be tied onto the previous segments by using temporary prestressing bars. These bars will be removed when permanent cantilever cables have been stressed.

## **1.7 Construction Methods for Stonecutters Bridge**

### *Substructure*

- 1.7.1 Land piles and pile caps for the approach structure and Main Tower will be constructed in the same way as the viaducts.

### *Tower Construction*

- 1.7.2 It is expected that the main towers and possibly the approach span piers would also be constructed using slip form techniques. However, the selected contractor will decide on the precise construction methods at a later stage.
- 1.7.3 For the main towers it is assumed that 2m/day would be achievable, giving 4 months slip forming construction time, with a month either side allowed for assembling / dismantling the rig.
- 1.7.4 It is assumed that concrete would be supplied from a haul road.

### *Anchor Block Construction*

- 1.7.5 On the assumption that the bridge will be a suspension bridge (the more conservative case), two anchor blocks will be required, each one located approximately 250m behind the bridge towers, one will be located at CT8 and one at CT9. Construction will involve the excavation of a foundation 70m in diameter and 50m deep. The foundations and anchor block will then be formed. This is essentially a concreting operation.

### *Deck Construction*

- 1.7.6 Deck construction for the main span will be with precast deck units transported by barge and then craned into position.
- 1.7.7 The decks for the approach spans will be constructed using precast units. It is anticipated that the deck units for both sections will be precast at yards remote from the Bridge, (possibly outside Hong Kong) and transported to storage yards on Tsing Yi. However concrete casting near the Project is not ruled out at this stage. Due to environmental considerations suitable sites should allow sufficient buffer distances to SRs. The most suitable locations on these grounds would be at the industrial areas outside the western portal of the Nam Wan Tunnel and the reclamation to the east of Stonecutters Bridge.

*Bridge Construction Equipment*

- 1.7.8 Details of the estimated construction equipment required for the various construction phases are provided in the construction impact calculations in the EIA. The information was used to estimate construction noise and air quality impacts.

## 2. AIR QUALITY

### 2.1 Air Quality Parameters

- 2.1.1 Monitoring and audit of the Total Suspended Particulates (TSP) levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely action taken rectify the situation.
- 2.1.2 1-hour and 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. Upon approval of the ER, 1-hour TSP levels can be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.
- 2.1.3 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and other special phenomena and work progress of the concerned site etc. shall be recorded in detail. A sample data sheet is shown in Figure 2.1 at the end of this section.

### 2.2 Monitoring Equipment

- 2.2.1 High volume samplers (HVS) to be used for carrying out the 1-hr and 24-hr TSP monitoring shall comply with the following specifications:
- 0.6-1.7 m<sup>3</sup>/min (20-60 SCFM) adjustable flow range;
  - equipped with a timing/control device with +/- 5 minutes accuracy for 24 hours operation;
  - installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;
  - capable of providing a minimum exposed area of 406 cm<sup>2</sup> (63 in<sup>2</sup>);
  - flow control accuracy: +/- 2.5% deviation over 24-hr sampling period;
  - equipped with a shelter to protect the filter and sampler;
  - incorporated with an electronic mass flow rate controller or other equivalent devices;
  - equipped with a flow recorder for continuous monitoring;
  - provided with a peaked roof inlet;
  - incorporated with a manometer;
  - able to hold and seal the filter paper to the sampler housing at horizontal position;
  - easy to change the filter; and
  - capable of operating continuously for 24-hr period.
- 2.2.2 The ET is responsible for provision of the monitoring equipment. The ET leader shall ensure that sufficient number of HVSSs with an appropriate calibration kit are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The HVSSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc. shall be clearly labelled.

- 2.2.3 Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data shall be properly documented for future reference. All the data shall be converted into standard temperature and pressure conditions.
- 2.2.4 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded in the data sheet as mentioned in Section 2.1.
- 2.2.5 If the ET Leader may use a direct reading dust meter to measure 1-hr TSP levels. He shall submit sufficient information to the ER including calibration standards to prove that the instrument is capable of achieving a comparable result as that the HVS and may be used for the 1-hr sampling. The instrument should also be calibrated regularly, and the 1-hr sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.
- 2.2.6 Wind data monitoring equipment shall also be provided and set up at conspicuous locations for logging wind speed and wind direction near to the dust monitoring locations. The equipment installation location shall be proposed by the ET Leader and agreed with the ER. For installation and operation of wind data monitoring equipment, the following points shall be observed:
- the wind sensors should be installed on masts at an elevated level 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;
  - the wind data should be captured by a data logger and be downloaded for processing at least once a month;
  - the wind data monitoring equipment should be re-calibrated at least once every six months; and
  - wind direction should be divided into 16 sectors of 22.5 degrees each.
- 2.2.7 A minimum of 2 sets of equipment should be provided. One set shall be located at WKR, and one at Tsing Yi. In exceptional situations, the ET Leader may propose alternative methods to obtain representative wind data upon approval from the ER.

### **2.3 Laboratory Measurement/ Analysis**

- 2.3.1 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments, to handle the dust samples collected, shall be available for sample analysis, equipment calibration and maintenance. The laboratory should be HOKLAS accredited.
- 2.3.2 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the ER and the measurement procedures shall be witnessed by the ER. The ET Leader shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix A for his reference.
- 2.3.3 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no folds or pin holes, and shall be conditioned in a humidity controlled chamber for over 24-hr and be pre-weighed before sampling.

2.3.4 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper is then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

2.3.5 All the collected samples shall be kept in a good condition for 6 months before disposal.

## 2.4 Monitoring Locations

2.4.1 The dust sensitive receivers and therefore potential monitoring locations are shown in Figure 1.1. These include the following:

### *Existing Sensitive Receivers:*

- Mei Foo Sun Chuen;
- Stonecutters Base residential accommodation
- Hong Kong Technical College (Tsing Yi) and Staff Quarters
- Mayfair Garden
- Cheung Ching Estate

### *Future Receivers:*

- Site 6 and Site 10 at the West Kowloon reclamation (if they are occupied by time of construction of R9)

2.4.2 The status and locations of dust sensitive receivers may be revised after issue of this manual. The ET Leader shall identify the SR locations to be adopted based on the updated construction programme and seek approval from the ER.

2.4.3 The monitoring locations should be chosen based on the following criteria:

- a horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
- no two samplers should be placed less than 2 meter apart;
- the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
- a minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
- a minimum of 2 metre separation from any supporting structure, measured horizontally is required;
- no furnace or incinerator flues are nearby;
- airflow around the sampler is unrestricted;
- the sampler is more than 20 metres from the dripline;
- any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;
- permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the samplers.

## 2.5 Baseline Monitoring

- 2.5.1 The ET Leader shall carry out baseline monitoring as close as is practical to sensitive receivers at:
- Mei Foo Sun Chuen;
  - Stonecutters Base (access arranged via Security Bureau)
  - Hong Kong Technical College (Tsing Yi) and Staff Quarters
  - Mayfair Garden
  - Cheung Ching Estate:
  - Site 6 and Site 10 at the West Kowloon reclamation (if construction is substantially completed)
- 2.5.2 The exact locations should be agreed with the ER prior to commencement of the monitoring programme.
- 2.5.3 Monitoring shall be for 14 consecutive days prior to the commissioning of the construction works to obtain daily 24-hr TSP samples (total of 84 24-hour average measurements). 1-hr sampling shall also be done at least 6 times at each location (total of 36 1-hour average measurements).
- 2.5.4 During the baseline monitoring programme, there should not be any construction or dust generation activities in the vicinity of the monitoring stations.
- 2.5.5 In exceptional case, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with the ER to agree on an appropriate set of data to be used as a baseline reference and submit to ER for approval.
- 2.5.6 Ambient conditions may vary seasonally and shall be reviewed at three monthly intervals. If the ET Leader considers that the ambient conditions have been changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be at times when the contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with ER.
- 2.5.7 Access to Stonecutters Base is unlikely to be granted for security reasons. In this case a location as close as practical to the perimeter of the base should be adopted after liaison with Security Bureau. If there are no suitable locations, at the discretion of the ER, monitoring may not be required in this area.

## 2.6 Impact Monitoring

- 2.6.1 The ET shall carry out regular impact monitoring during the course of the Works. Monitoring shall be undertaken at a minimum of 3 stations for 24-hr TSP monitoring. A sampling frequency of one 24 hour measurement every six-days at 3 stations shall be adopted. For 1-hr TSP monitoring, the sampling frequency of at least three one hour periods in every six-days should be undertaken, when and where the highest dust impacts are expected.

2.6.2 In case of non-compliance with the air quality criteria, more frequent monitoring shall be conducted within 24 hours of the non-compliance. This is specified in the Action Plan in Section 2.7. Further monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified.

## 2.7 Event and Action Plan for Air Quality

2.7.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET Leader shall compare the impact monitoring results with air quality criteria set up for 24-hour TSP and 1-hr TSP. Table 2.1 shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance of the air quality criteria occurs, the ET, the ER and the Contractor shall undertake the relevant action in accordance with the Action Plan in Table 2.2.

**Table 2.1 : Action and Limit Levels for Air Quality**

Parameters	Action	Limit
24 Hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level < 108 $\mu\text{g}/\text{m}^3$ Action level = average of baseline level plus 30 % and Limit level For baseline level >108 $\mu\text{g}/\text{m}^3$ and baseline level < 154 $\mu\text{g}/\text{m}^3$ Action level = 200 $\mu\text{g}/\text{m}^3$ For baseline level >154 $\mu\text{g}/\text{m}^3$ Action level = 130 % of baseline level	260
1 Hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level < 154 $\mu\text{g}/\text{m}^3$ Action level = average of baseline level plus 30 % and Limit level For baseline level >154 $\mu\text{g}/\text{m}^3$ and baseline level < 269 $\mu\text{g}/\text{m}^3$ Action level = 350 $\mu\text{g}/\text{m}^3$ For baseline level >269 $\mu\text{g}/\text{m}^3$ Action level = 130 % of baseline level	500

**Table 2.2 : Event/Action Plan for Air Quality**

Event Level	Action		
	ET	ER	CONTRACTOR
<b>Action Level</b>			
Exceedance for one sample	<ul style="list-style-type: none"> <li>• Identify source</li> <li>• Inform ER</li> <li>• Repeat Measurement to confirm finding</li> <li>• Increase monitoring frequency to daily</li> </ul>	<ul style="list-style-type: none"> <li>• Notify Contractor</li> <li>• Check mortaring data and Contractor's working methods</li> </ul>	<ul style="list-style-type: none"> <li>• Rectify any unacceptable practice</li> <li>• Amend working methods if appropriate</li> </ul>
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>1. Identify source</li> <li>2. Inform ER</li> <li>3. Repeat measurements to confirm findings</li> <li>4. Increase monitoring frequency to daily</li> <li>5. Discuss with ER for remedial actions required</li> <li>6. If exceedance continues arrange meeting with ER</li> <li>7. If exceedance stops, cease additional monitoring</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing</li> <li>2. Notify Contractor</li> <li>3. Check monitoring data and Contractor's working methods</li> <li>4. Discuss with Environmental Supervisor and Contractor on potential remedial actions</li> <li>5. Ensure remedial actions properly implemented</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit proposals for remedial actions to ER within J working days of notification</li> <li>2. Implement the agreed proposals</li> <li>3. Amend proposal if appropriate</li> </ol>



Event Level	Action		
	ET	ER	CONTRACTOR
<b>Limit Level</b>			
Exceedance for one sample	<ol style="list-style-type: none"> <li>1. Identify source</li> <li>2. Inform ER and EPD</li> <li>3. Repeat measurement to confirm finding</li> <li>4. Increase monitoring frequency to daily</li> <li>5. Assess effectiveness of Contractor's remedial actions and keep EPD and ER informed of the results</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing</li> <li>2. Notify Contractor</li> <li>3. Check monitoring data and Contractor's working methods</li> <li>4. Discuss with Environmental Team Leader and Contractor potential remedial actions</li> <li>5. Ensure remedial actions properly implemented</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance</li> <li>2. Submit proposals for remedial actions to ER within 3 working days of notification</li> <li>3. Implements the agreed proposals</li> <li>4. Amend proposal if appropriate</li> </ol>
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>1. Identify source</li> <li>2. Inform ER and EPD the causes &amp; actions taken for the exceedances</li> <li>3. Repeat measurement to confirm findings</li> <li>4. Increase monitoring frequency to daily</li> <li>5. Investigate the causes of exceedance</li> <li>6. Arrange meeting with EPD and ER to discuss the remedial actions to be taken</li> <li>7. Assess effectiveness of Contractor's remedial actions and keep EPD and ER informed of the results &amp; if exceedance stops, cease additional monitoring</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing</li> <li>2. Notify Contractor</li> <li>3. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented</li> <li>4. Discuss amongst Environmental Team Leader and the Contractor potential remedial actions</li> <li>5. Review Contractor's remedial actions whenever necessary to assure their effectiveness</li> <li>6. If exceedance continues consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action avoid further exceedance</li> <li>2. Submit proposals for remedial actions to ER within 3 working days of notification</li> <li>3. Implements the agreed proposals</li> <li>4. Resubmit proposals if problem still not under control</li> <li>5. Stop the relevant portion of works as determined by the ER until the exceedance is abated</li> </ol>

## 2.8 Dust Mitigation Measures

2.8.1 The EIA report has discussed in general terms the appropriate dust control and mitigation measures, these are provided in more detail below. The Contractor shall implement dust suppression measures which shall include, but not be limited to, the following :

- Stockpiles of sand and aggregate greater than 20m<sup>3</sup> for use in concrete manufacture shall be enclosed on three sides, with walls extending above the pile and 2 metres beyond the front of the pile.
- Effective water sprays shall be used during the delivery and handling of all raw sand and aggregate, and other similar materials, when dust is likely to be created and to dampen all stored materials during dry and windy weather.
- Areas within the Site where there is a regular movement of vehicles shall have an approved hard surface and be kept clean of loose surface material.
- Conveyor belts shall be fitted with windboards, and conveyor transfer points and hopper discharge areas shall be enclosed to minimise dust emission. All conveyors carrying materials which have the potential to create dust shall be totally enclosed and fitted with belt cleaners.

- Cement and other such fine grained material delivered in bulk shall be stored in close silos fitted with a high level alarm indicator. The high level alarm indicators shall be interlocked with the filling line such that in the event of the hopper approaching an overfull condition, an audible alarm will operate, and the pneumatic line to the filling tanker will close. All air vents on cement silos shall be fitted with suitable fabric filters provided with either shaking or pulse-air cleaning mechanisms. The fabric filter area shall be determined using an air-cloth ratio (filtering velocity) of 0.01 - 0.03 m/s.
- Weigh hoppers shall be vented to a suitable filter.
- The filter bags in the cement silo dust collector must be thoroughly shaken after cement is blown in to the silo to ensure adequate dust collection for subsequent loading.
- The provision of adequate dust suppression plant including water bowsers with spray bars.
- Unless otherwise approved by the ER the Contractor shall restrict all motorised vehicles on the site to a maximum speed of 15km per hour and confine haulage and delivery vehicles to designated roadways inside the Site.
- The Contractor shall arrange his blasting techniques so as to minimise dust generation.

At any concrete batching plant or crushing plant being operated on the Site the following additional conditions shall be compiled with:

- The Contractor shall undertake at all times to prevent dust nuisance as a result of his activities. An air pollution control system shall be installed and shall be operated whenever the plant is in operation.
- Where dusty material are being discharged to vehicles from a conveying system at a fixed transfer point, a three-sided roofed enclosure with a flexible curtain across the entry shall be provided. Exhaust fans shall be provided for this enclosure and vented to a suitable fabric filter system.
- Any vehicle with an open load carrying area used for moving potentially dust producing material shall have properly fitting side and tail boards. Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin in good condition. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards.
- The Contractor shall frequently clean and water the concrete batching plant and crushing plant site and ancillary areas to minimise any dust emissions.
- Dry mix batching shall be carried out in a totally enclosed area with exhaust to suitable fabric filters.
- If the above measures are not sufficient to restore the air quality to acceptable levels upon the advice of ET Leader, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose to ER for approval, and implement the mitigation measures.

### 3. NOISE

#### 3.1 Noise Parameters

- 3.1.1 The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level ( $L_{eq}$ ).  $L_{eq}(30 \text{ min})$  shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods,  $L_{eq} (5 \text{ min})$  shall be employed for comparison with the NCO criteria.
- 3.1.2 As supplementary information for data auditing, statistical results such as  $L_{10}$  and  $L_{90}$  shall also be obtained for reference. A sample data record sheet is shown in Figure 3.1 for reference.

#### 3.2 Monitoring Equipment

- 3.2.1 As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agree to within 1.0dB.
- 3.2.2 Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding  $5 \text{ ms}^{-1}$  or wind with gusts exceeding  $10 \text{ ms}^{-1}$ . The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in  $\text{ms}^{-1}$ .
- 3.2.3 The ET Leader is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled.

#### 3.3 Monitoring Locations

- 3.3.1 The noise sensitive receivers and therefore potential monitoring locations are shown in Figure 1.1.

*The noise sensitive receivers and monitoring locations are:*

- Mei Foo Sun Chuen;
- Stonecutters Base (access to be arranged via Security Bureau)
- Hong Kong Technical College (Tsing Yi) and Staff Quarters
- Mayfair Garden
- Cheung Ching Estate
- Site 6 and Site 10 at the West Kowloon reclamation if occupied

- 3.3.2 The status and locations of noise sensitive receivers may require review after issuing this manual. It is proposed that the ET Leader shall identify the SR locations to be adopted based on prevailing conditions. These shall be agreed with the ER.
- 3.3.3 Monitoring locations should be based on the following criteria:
- at locations close to the major site activities which are likely to have noise impacts;
  - close to the noise sensitive receivers
  - for monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.
- 3.3.4 The monitoring station shall normally be at a point 1m from the exterior of the noise sensitive facade and be at a position 1.2m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3dB(A) shall be made to the free field measurements. The ET Leader shall agree with the ER on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

### **3.4 Baseline Monitoring**

- 3.4.1 The ET Leader shall carry out baseline noise monitoring prior to the commencement of the construction works. The baseline monitoring shall be carried out continuously for a period of 14 days at each location. The measured parameter will be Leq 30 minutes (total of 4032 30-minute measurements). In addition, 12 measurements for Leq 5 minutes between the hours of 19:00 – 23:00, and 12 measurements for Leq 5 minutes between the hours of 23:00 – 07:00 shall be undertaken at each location (total of 144 measurements). A schedule on the baseline monitoring shall be submitted to the ER for approval before the monitoring starts.
- 3.4.2 There shall not be any construction activities in the vicinity of the stations during the baseline monitoring.
- 3.4.3 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader will agree with ER on an appropriate set of data to be used as a baseline reference.
- 3.4.4 Background noise sources in the study area are currently dominated by construction and industrial activity. Background noise in many parts of the study area, especially around the major roads bordering the hinterland is characterised typically by high  $L_{90}$  values in many areas during the day.
- 3.4.5 Access to Stonecutters Base may not be possible for security reasons. In this case a location as close as practical to the residential accommodation near the northern boundary of the base should be adopted. If there are no suitable locations or objections raised for security reasons, monitoring may not be required in this area at the discretion of the ER.

### 3.5 Impact Monitoring

3.5.1 Noise monitoring shall be carried out at all the designated monitoring station. The monitoring frequency shall depend on the scale of the construction activities. The following is an initial guide on the regular monitoring frequency for each station on a per week basis when noise generating activities are underway:

- one Leq 30 minute measurement between 0700-1900 hours on normal weekdays;
- 6 Leq 5 minute measurements between 1900-2300 hours (if evening activities are undertaken);
- 4 Leq 5 minute measurements between 2300-0700 hours of next day (if night time activities are undertaken); and
- 6 Leq 5 minute measurements between 0700-1900 hours on holidays (if activities are undertaken).

3.5.2 For the school at Mei Foo, noise monitoring shall be carried out during the school examination periods. The ET Leader shall liaise with the schools personnel and the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the contract.

3.5.3 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in Section 3.6 shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

### 3.6 Event and Action Plan for Noise

3.6.1 The Action and Limit levels for construction noise are defined in Table 3.1. Should non-compliance of the criteria occur, action in accordance with the Action Plan in Table 3.2, shall be carried out.

**Table 3.1 : Action and Limit Levels for Construction Noise**

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one documented complaint is received	75*dB(A)
0700-2300 hrs on holidays; and 1900-2300 hrs on all other days		60/65/70**dB(A)
2300-0700 hrs of next day		45/50/55**dB(A)

\* reduce to 70dB(A) for schools and 65 dB (A) during school examination periods.

\*\* to be selected based on Area Sensitivity Rating.

**Table 3.2 : Event/Action Plan for Construction Noise**

Event	Action		
	ET Leader	ER	Contractor
Action Level	<ol style="list-style-type: none"> <li>1. Notify ER</li> <li>2. Analyse investigation</li> <li>3. Increase monitoring frequency to check mitigation effectiveness</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify Contractor</li> <li>2. Require Contractor to propose measures for the analysed noise problem</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit noise mitigation proposals to Environmental Team</li> <li>2. Implement noise mitigation proposals</li> </ol>
Limit Level	<ol style="list-style-type: none"> <li>1. Notify ER</li> <li>2. Notify EPD</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify Contractor</li> <li>2. Require contractor to implement mitigation measures. Increase monitoring frequency to check mitigation effectiveness</li> </ol>	<ol style="list-style-type: none"> <li>1. Implement mitigation measures</li> <li>2. Prove to Environmental Team Leader ER effectiveness of measures applied</li> </ol>
*	<p><i>Suggested Mitigation Measures:</i></p> <ul style="list-style-type: none"> <li>• <i>Relocation of noise emitting plant</i></li> <li>• <i>Use of silenced or super-silenced equipment</i></li> <li>• <i>Use of acoustic sheds or screens</i></li> <li>• <i>Limit quantity of plant operating</i></li> <li>• <i>Change working technique</i></li> </ul>		

### 3.7 Noise Mitigation Measures

- 3.7.1 The EIA report has discussed the noise mitigation measures in general terms these are given in more detail below.
- 3.7.2 The Contractor shall consider noise as an environmental constraint in his planning and execution of the Works.
- 3.7.3 The Contractor shall take all necessary measures to ensure that the operation of all mechanical equipment and construction processes on or off the Site shall not cause any unnecessary and excessive noise which may disturb any occupant of any nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise. The Contractor shall submit to the ER for his approval details of all Constructional Plant including methods of use and construction operations together with proposed measures for limiting noise therefrom which shall include, but not be limited to the relocation of noise-emitting plant, the use of silencers, mufflers, acoustic sheds or shields, or acoustic sheds or screens and shall be based upon the best reasonable practice. Information on the types and models of silenced equipment and acoustic treatment for unsilenced equipment shall be included. The Contractor shall use all such measures and shall maintain all plant and silencing equipment in good condition so as to minimise the noise emission during construction works.
- 3.7.4 The Contractor's attention is drawn to the fact that Regulations under the Noise Control Ordinance are made from time to time. Those currently in force are :-

- Noise Control (Hand Held Percussive Breakers) Regulations
  - Noise Control (Air Compressors) Regulations
  - Noise Control (Hearing Protection) Regulations
  - The Factories and Industrial Undertakings (Noise at Work) Regulations are also applicable.
- 3.7.5 The Contractor shall be responsible for obtaining Construction Noise Permits (CNPs) from EPD as required for his operations. The locations of suspected Noise Sensitive Receivers (NSRs) are indicated in the Particular Specification, but the Contractor shall be responsible for obtaining and complying with the requirements for EPD regarding identification of NSRs and conditions attached to CNPs. All correspondence with EPD and each issued CNP shall be copied to the ER.
- 3.7.6 The Contractor's attention is drawn to the fact that other construction work in the vicinity of the Site will be taken into account by EPD in assessing applications for CNP.
- 3.7.7 The Contractor shall arrange methods of working to minimise noise impacts, and shall provide experienced personnel with suitable training to ensure that these methods are implemented.
- 3.7.8 If, after commencement of the Works, the construction plant, equipment or methods of working are believed by the ER to be causing serious noise pollution impacts, they shall be inspected and remedial proposals drawn up by the Contractor, consented to by the ER and implemented. In developing these remedial measures, the Contractor will be expected to review all construction noise sources that may be contributing to the pollution impacts in order to achieve an overall reduction of cumulative noise impacts. The contractor will propose changes to plant locations and scheduling of activities, installation of plant soundproofing, provision of alternative plant, erection of sound barriers around part of the Site or the location of construction noise sources, or any other measures that may be effective in reducing noise. Where such remedial measures include the use of additional or alternative construction plant or equipment, such construction plant or equipment shall not be used on the Works until the ER's consent has been given. Where remedial measures include maintenance or modification of previously approved construction plant or equipment such construction plant or equipment shall not be used on the Works until such maintenance or modification is completed and the adequacy of the maintenance or modification is demonstrated to the satisfaction of the ER.
- 3.7.9 If the above measures are not sufficient to restore the construction noise quality to an acceptable levels upon the advice of ET Leader, the Contractor shall liaise with the ET Leader on alternative mitigation measures, propose to ER for approval, and carry out the mitigation measures.

### **3.8 Noise Monitoring in the Operation Phase**

The details of noise monitoring shall be subject to the detailed monitoring plan deposited to the Director of Environmental Protection as per Section 8 of the Environmental Monitoring and Auditing Manual.

2 stations will be established at the following stations to monitor the noise local during the operation phase of Route 9.

- Tsing Yi Technical College
- Mei Foo Sun Chun

The exact location will be determined and agreed 6 months before the road opening. The noise level at these locations will be measured immediately before the opening (baseline measurement) and thereafter at 6 months interval within the first year. Traffic counts will be taken at the same time as the noise level are measured to allow validation against the noise level predicated in the EIA Study.



## 4. WATER QUALITY

### 4.1 Water Quality Mitigation Measures

- 4.1.1 The EIA report has not recommended any water quality monitoring *per se* however, we recommend site specific controls and mitigation measures to manage surface runoff from construction sites. The Contractor shall be responsible for the design and implementation of these measures. We propose that the Contractor implements water quality mitigation measures which shall include, but not be limited to, the following:
- 4.1.2 The Contractor shall not discharge directly or indirectly (by runoff) or cause or permit or suffer to be discharged into any public sewer, storm-water drain channel, stream-course or sea, any effluent or foul or contaminated water or cooling or hot water without the prior consent of EPD who may require the Contractor to provide, operate and maintain at the Contractor's own expense, within the premises or otherwise, suitable works for the treatment and disposal of such effluent or foul or contaminated or cooling or hot water.
- 4.1.3 If any office, site canteen or toilet facilities is erected, foul water effluent shall be directed to a foul sewer or to a sewage treatment facilities either directly or indirectly by means of pumping.
- 4.1.4 The Contractor's attention is drawn to the Buildings Ordinance, the Water Pollution Control Ordinance, and the Technical Memorandum "Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters" issued by the EPD.
- 4.1.5 Additional requirements are listed in Section 9.
- 4.1.6 In order to reduce the amount of suspended solids in effluent to the levels quoted in the Technical Memorandum, the Contractor shall install setting tanks followed by one or a combination of :
- Multiple-plate thickeners
  - Centrifuges
  - Mechanical Filters
  - Hydrocyclones
- 4.1.7 All equipment shall be regularly cleaned and maintained in good working order.
- 4.1.8 If the above measures are not sufficient to restore the water quality to an acceptable levels upon the advice of the ET Leader, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose to ER for approval, and carry out the mitigation measures.

## 5. WASTE MANAGEMENT

- 5.1.1 The Contractor is responsible for waste control within the construction site, removal of the waste material produced from the site and to implement any mitigation measures to minimise waste or redress problems arising from the waste from the site. The waste material may include any tunnel spoil, sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the site onto any adjoining land, storm sewer, sanitary sewer, or any waste matter or refuse to be deposited anywhere within the site or onto any adjoining land.
- 5.1.2 When handling the waste material, the following measures shall be undertaken:
- 5.1.3 The strategy for management and disposal of all wastes arising from execution of individual projects will need to be based on the principle of segregation and re-use on site followed by disposal to reclamation, public dump or land fill as appropriate.
- 5.1.4 It is not anticipated that bulk excavations will be carried out in the underlying mud and any limited quantities of mud, which may arise, will be disposed of at landfill.
- 5.1.5 Where surplus excavated material is to be exported from the tunnel excavations to public dumps this should be carried out by marine transfer if at all possible. It is recommended that a barge loading point be provided under one of the contracts to facilitate transfer of suitable material to public dumps which are accessible by barge and which can be equipped with off loading facilities. Public dumping areas will be designated by the Fill Management Committee.
- 5.1.6 Disposal of other construction wastes arising as a result of construction of structures and buildings is governed by the EPD policy on disposal for construction waste. The principles established maximise re-use of materials on site and segregation of wastes to ensure that the minimum quantities are disposed of to landfill and that the maximum is directed for disposal off-site to reclamation by public dumping. All construction waste should therefore be sorted on site into inert and non-inert materials.
- 5.1.7 Non-inert materials such as wood and other materials including glass, plastics, steel and metals should be disposed of a landfill. Other inert materials like soil, sand, rubble, are to be separated from non-inert and disposed of at public dumps.
- 5.1.8 In addition quantities of site fencing, scaffolding and timber for the building work should be reused where possible. Those materials that cannot be re-used will require disposal at landfill.
- 5.1.9 Paint residues, lubricants and other oily wastes are classified as chemical waste under the Waste Disposal (Chemical Waste) (General) Regulations and special controls are imposed to regulate storage, labelling transport and disposal at the Chemical Waste Treatment Centre. Construction sites must register individual as chemical waste producers to comply.
- 5.1.10 The Contractor shall also pay attention to the Waste Disposal Ordinance, the Dumping at Sea Ordinance, the Public Health and Municipal Services Ordinance and the Water Pollution Control Ordinance, and carry out the appropriate waste management work. The relevant license/permit, such as the effluent discharge license, the chemical waste producer registration, etc. shall be obtained. The Contractor shall refer to the relevant booklets issued by EPD when applying for the license/permit.

- 5.1.11 During the site inspections and the document review procedures as mentioned in Section 6.1 and 6.2 of this manual, the ET Leader shall pay special attention to the issues relating to waste management, and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong.
- 5.1.12 Mitigation measures are summarised in the Schedule of Impacts and Mitigation Measure of Section 10.

## **6. LANDSCAPE WORKS**

### **6.1 Mitigation**

6.1.1 The following measures are identified in the EIA for mitigation of landscape and visual impacts:

- Compatible design of highway structures and associated works with the major adjoining highway infrastructure;
- Highway lighting design to minimise leakage of light and glare disturbance;
- Use of reflective paints and signage to reduce the highway lighting requirements;
- Visually unobtrusive design of portal structures and buildings;
- Location of the eastern Nam Wan Tunnel portals buildings between the portals or over the portal structures to reduce the platform area and associated slope works;
- Retention of vegetation at the Nam Wan Tunnel Portals;
- Protection of portal vegetation and the stream below the East Nam Wan Tunnel Portals during construction;
- Minimisation of the land requirements and associated vegetation and stream disturbance for the temporary construction access road to the eastern Nam Wan Tunnel portals;
- Erection, painting and maintenance of site hoardings around works and storage areas;
- Restrictions on the height of material/spoil stockpiles;
- Prompt hydroseeding of disturbed areas and cut/fill slopes prior to the permanent landscaping works;
- Reinstatement of the east Nam Wan Tunnel portals construction access road corridor and works areas around viaduct columns;
- Screen planting around the eastern Nam Wan Tunnel portal buildings;
- Minimisation and blending of slope works at eastern Nam Wan Tunnel portal;
- Avoidance of chunam or shotcreting slope treatments;
- Conservation of topsoil where practical;
- Site litter patrols and regular site waste collection;
- Maintenance of planting.

### **6.2 Monitoring and Audit Requirements**

6.2.1 Monitoring of landscaping works will to a large extent fall under the main works contract through inspection to ensure that works are implemented in accordance with specifications. In addition, it is normal for the landscape contractor to provide on site maintenance for 12 months following completion of works.

6.2.2 During the monitoring and audit of noise, dust and runoff, visual inspection with regard to condition of landscaping works should be made, and this should be reported in the monthly audit reports.

## **7. SITE ENVIRONMENTAL AUDIT**

### **7.1 Site Inspections**

7.1.1 Site Inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They shall be undertaken routinely and results catalogued in a site diary to facilitate inspection of the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. With well defined pollution control and mitigation specifications and a well established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

7.1.2 The ET Leader is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspection works. He shall submit a proposal on the site inspection, deficiency and action reporting procedures within 21 days of the construction contract commencement to the Contractor for agreement and to the ER for approval.

7.1.3 Regular site inspections shall be carried out at least once per week. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situations outside the site, which are likely to be affected, directly or indirectly, by the site activities. The ET Leader shall make reference to the following information in conducting the inspection:

- the EIA recommendations on environmental protection and pollution control mitigation measures.
- works progress and programme;
- individual works methodology proposals (which shall include proposals on associated pollution control measures);
- the contract specifications on environmental protection;
- the relevant environmental protection and pollution control laws; and
- previous site inspection results.

7.1.4 The ET Leader shall request all information of the construction contract from the Contractor required for him to carry out the site inspections. The inspection results and associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the ER and the Contractor within 24 hours, for reference and for taking immediate action.

7.1.5 Ad hoc site inspections shall also be carried out if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

### **7.2 Compliance with Legal and Contractual Requirements**

7.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong, to which the construction activities shall comply with.

- 7.2.2 In order that the works are in compliance with the contractual requirements, all the works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.
- 7.2.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that the any foreseeable potential for violating the laws can be prevented.
- 7.2.4 The ET shall regularly request copies of relevant documents from the Contractor so that the checking work can be carried out. The documents shall at least include the updated Work Progress Reports, the updated Works Programme, the application letters for different license/permits under the environmental protection laws, and all the valid license/permits. The site diary shall also be available for the ET Leader's inspection upon his request.
- 7.2.5 After reviewing the document, the ET Leader shall advise the ER and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on license/permit application and any environmental protection and pollution control preparation works may not cope with the works programme or may result in potential violation of environmental protection and pollution control requirements by the works in due course, he shall also advise the Contractor and the ER accordingly.
- 7.2.6 Upon receipt of the advice, the ER shall follow up to ensure that the Contractor had taken appropriate action in order that the environmental protection and pollution control requirements are fulfilled.

### **7.3 Environmental Complaints**

- 7.3.1 Complaints shall be referred to the ET Leader for carrying out complaint investigation procedures. The ET Leader shall undertake the following procedures upon receipt of the complaints:
- log complaint and date of receipt onto the complaint database;
  - investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
  - if a complaint is valid and due to works, identify mitigation measures;
  - if mitigation measures are required, advise the Contractor accordingly;
  - review the Contractor's response on the identified mitigation measures, and the updated situation;
  - if the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;
  - undertake additional monitoring and audit to verify the situation if necessary, and review that any valid reason for complaint does not recur;
  - report the investigation results and the subsequent actions to the source of complaint for responding to complainant (If the source of complaint is EPD, the results should be reported within the time frame assigned by EPD); and

- record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.
- 7.3.2 During the complaint investigation work, the Contractor is requested to cooperate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the ER shall advise the Contractor to promptly carry out the mitigation. The ET shall inspect measures that have been carried out by the Contractor and advise ER of the acceptability.

## **8. REPORTING**

### **8.1 General**

8.1.1 The following reporting requirements based upon a paper documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the ER. This would enable a transition from a paper/historic and reactive approach to an electronic/real time proactive approach.

### **8.2 Baseline Monitoring Report**

8.2.1 The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to each of the three parties; the Contractor, the ER and the EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies required.

8.2.2 The baseline monitoring report shall include at least the following:

- a) a 1-2 page executive summary;
- b) brief project background information;
- c) drawings showing locations of the baseline monitoring stations;
- d) monitoring results (in both hard and diskette copies) together with the following information:
  - monitoring methodology;
  - equipment used and calibration details;
  - parameters monitored;
  - monitoring locations (and depth);
  - monitoring date, time, frequency and duration;
- e) details on influencing factors, including:
  - major activities, if any, being carried out on the site during the period;
  - weather conditions during the period;
  - other factors which might affect the results;
  - determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
- f) revisions for inclusion in the EM&A Manual; and
- g) comments and conclusions.

### **8.3 Monthly EM&A Reports**

8.3.1 The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due in the month after construction commences. A maximum of 4 copies of each monthly EM&A report shall be submitted to each of the three parties:



the Contractor, the ER and the EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium requirement.

8.3.2 The reports shall include at least the following :

- a) 1-2 pages executive summary;
- b) Basic project information including a synopsis of the project organisation, programme and management structure, and the work undertaken during the month;
- c) a brief summary of EM&A requirement including :
  - all monitoring parameters;
  - environmental quality performance limits (Action and Limit levels);
  - Event-Action Plans;
  - environmental mitigation measures, as recommended in the project EIA study final report;
  - environmental requirements in contract documents;
- d) advice on implementation status of environmental protection and pollution control/mitigation measures, and recommended in the project EIA study report, summarised in the updated implementation schedule;
- e) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- f) monitoring results (in both hard and diskette copies) together with the following information:
  - monitoring methodology
  - equipment used and calibration details
  - parameters monitored
  - monitoring locations (and depth)
  - monitoring date, time, frequency, and duration;
- g) graphical plots of trends of monitored parameters over the past four reporting periods for representative monitoring stations annotated against the following:
  - major activities being carried out on site during the period;
  - weather conditions during the period; and
  - any other factors which might affect the monitoring results;
- h) advice on the solid and liquid waste management status;
- i) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- j) a review of the reasons for and the implications of non-compliance and deficiency reporting and any follow-up procedures;

- k) a description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance;
- l) a summary record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints; and
- m) An account of the future key issues as reviewed from the works programme and work method statements.

8.3.3 The subsequent monthly EM&A reports shall include the following :

- a) Title Page
- b) Executive Summary (1-2 pages)
  - Breaches of AL levels
  - Complaint Log
  - Reporting Changes
  - Future key issues
- c) Contents Page
- d) Environmental Status
  - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations
  - Summary of non-compliance with the environmental quality performance limits
  - Summary of complaints
- e) Environmental Issues and Actions
  - Review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies)
  - Description of the actions taken in the event of non-compliance and deficiency reporting
  - Recommendations (should be specific and target the appropriate party for action)
  - Implementation status of the mitigatory measures and the corresponding effectiveness of the measures
- f) Future Key Issues
- g) Appendix
  - AL levels
  - Graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:

- h) major activities being carried out site during the period;
  - weather conditions during the period; and
  - any other factors which might affect the monitoring results
  - Monitoring schedule for the present and next reporting periods
  - Cumulative complaints statistics
  - Details of complaints, outstanding issues and deficiencies

#### 8.4 Quarterly EM&A Summary Reports

8.4.1 The quarterly EM&A summary report which should generally be around 5 pages (including about 3 of text and tables and 2 of figures) should contain at least the following information:

- a) up to half a page executive summary;
- b) basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter;
- c) a brief summary of EM&A requirements including:
  - monitoring parameters;
  - environmental quality performance limits (Action and Limit levels); and
  - environmental mitigation measures, as recommended in the project EIA study final report;
- d) advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation schedule;
- e) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control station;
- f) graphical plots of the trends of monitored parameter over the past 4 months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against;
  - the major activities being carried out on site during the period;
  - weather conditions during the period; and
  - any other factors which might affect the monitoring results;
- g) advice on the solid and liquid waste management status;
- h) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- i) a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
- j) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

- k) comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and
- l) Proponent's contacts and hotline telephone number for the public to make enquiries.

## 8.5 Data Keeping

8.5.1 The site document such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the monthly EM&A report for submission. However, the document shall be kept by the ET Leader and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. The monitoring data shall also be recorded in magnetic media form, and the software copy can be available upon request. The documents and data, which shall be kept for at least one year after completion of the construction contract, will include:

- a) Environmental Issues and Actions
  - Revise issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies)
  - Describe the actions taken in the event of non-compliance and deficiency reporting
  - Recommendations (should be specific and target the appropriate party for action)
  - Implementation status of the mitigation measures and the corresponding effectiveness of the measures
- b) Future Key Issues
- c) Appendix
  - AL levels
  - Graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
    - i) major activities being carried out on site during the period;
    - ii) weather conditions during the period; and
    - iii) any other factors which might affect the monitoring results
  - Monitoring schedule for the present and next reporting period
  - Cumulative complaints statistics
  - Details of complaints, outstanding issues and deficiencies

## 8.6 Interim Notifications of Environmental Quality Limit Exceedances

8.6.1 With reference to Event/Action Plans in Tables 2.2 and 3.2, when the environmental quality limits are exceeded, the ET Leader shall immediately notify the ER & EPD, as appropriate. The notification shall be followed up with advice to EPD on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notifications is shown in Figure 7.1.

## 9. OPERATION PHASE EM&A

### 9.1 Introduction

- 9.1.1 Under the conditions of the EIAO, there is a requirement for operational phase noise monitoring. It is proposed that  $L_{10}$  (peak hour) noise levels are monitored at Hong Kong Technical College (Tsing Yi) and Mei Foo Sun Chun following completion of construction but prior to the road opening. During the first year of operation, monitoring should be undertaken at the same locations on two further occasions. Traffic (flows and HGV percentage) counts should be undertaken for Route 9 at the same time.
- 9.1.2 The Project Proponent shall deposit with the Director of Environmental Protection (the Director), at least 6 months before the operation of the project, a monitoring plan to be undertaken for the purpose of assessing the accuracy of traffic noise predictions by comparing the project noise impact predictions with the actual impacts. The monitoring plan shall contain monitoring locations, monitoring schedules, methodology of noise monitoring including noise measurement procedures, traffic counts and speed checks, and methodology of comparison with the predicted levels. Three sets of measurements (each 30 minutes) at middle and upper levels during periods of peak traffic flow on normal weekdays shall be conducted at each measurement location. Monitoring shall be conducted in accordance with the deposited monitoring plan unless changes have been justified to the Director. Monitoring details and results including the comparison between the measured noise levels and the predicted levels shall be recorded in a report to be deposited with the Director within one month of the completion of the monitoring. The report shall be certified by the Project Proponent before submission to the Director.

## 10. SCHEDULE OF IMPACTS AND MITIGATION MEASURES

No.	EIA Ref.	Activity	Mitigation/EIA Recommendations	Responsibility for Implementation	Audit Method	Implementation Status/Date	Auditors Signature
1	Section 2	Operational Traffic Noise	<p>Provision of Low Noise Surfacing on all the new roads except the R9-CT9 sliproad</p> <p>Provision of a 3m barrier along the main carriageways of Route9/Route 16 at the LWI (Figure 2.2 illustrates)</p> <p>Provision of a 3m barrier on the Route 9/WKH link road – east bound (Figure 2.2 illustrates)</p> <p>Provision of a 5.1m high barrier with 2.8m cantilever on the CT9 slip road. (** see note for chainages and grids reference). The location, outline design and materials of the proposed mitigation measures shall be referenced to Figures 2.1, 2.2 and 2.3. Any subsequent changes to the proposed mitigation measures shall be subjected to re-submission according for the EIAO requirements/procedures.</p>	HyD	Design Approval Stage	Prior to operation	
2	Section 3	Operational Air Quality	Avoid air sensitive uses in areas where the AQO is exceeded in Area 6.	Housing Dept	Approval Structural Layout Plans	N/A	
3	Section 4	Operational Water Quality	Discharges should avoid the diverted stream at the eastern portal. Tunnel discharges should be connected to oil interceptors prior to discharging to the stormdrains.	HyD's Contractor	Design Approval Stage	N/A	
4	Section 5	Landscape and visual	<p>Compatible design of highway structures and associated works with the major adjoining highway infrastructure;</p> <p>Highway lighting design to minimise leakage of light and glare disturbance;</p> <p>Use of reflective paints and signage to reduce the highway lighting requirements;</p> <p>Visually unobtrusive design of portal structures and buildings;</p> <p>Location of the eastern Nam Wan Tunnel portals buildings between the portals or over the portal structures to reduce the platform area and associated slope works;</p>	HyD	Design Approval Stage	N/A	

No.	EIA Ref.	Activity	Mitigation/EIA Recommendations	Responsibility for Implementation	Audit Method	Implementation Status/Date	Auditors Signature
			<p>Retention of vegetation at the Nam Wan Tunnel Portals;            Protection of portal vegetation and the stream below the East Nam Wan Tunnel Portals during construction;            Minimisation of the land requirements and associated vegetation and stream disturbance for the temporary construction access road to the eastern Nam Wan Tunnel portals;            Erection, painting and maintenance of site hoardings around works and storage areas;            Restrictions on the height of material/spoil stockpiles;            Prompt hydroseeding of disturbed areas and cut/fill slopes prior to the permanent landscaping works;            Reinstatement of the east Nam Wan Tunnel portals construction access road corridor and works areas around viaduct columns;            Screen planting around the eastern Nam Wan Tunnel portal buildings;            Minimisation and blending of slope works at eastern Nam Wan Tunnel portal;            Avoidance of chunam or shotcreting slope treatments;            Conservation of topsoil where practical;            Site litter patrols and regular site waste collection;            Maintenance of planting.</p>	<p>RSS to ensure measures undertaken by Contractor</p> <p>HyD's Contractor</p>	<p>Contract Supervision</p> <p>Operational Procedures Audit</p>		
5	Section 6	Ecological Impact	<p>Minimise natural areas disturbed</p> <p>Replanting/rehabilitation should be with suitable species</p> <p>Minimise damage outside works areas</p>	<p>RSS</p> <p>RSS</p> <p>RSS to ensure measures undertaken by Contractor</p>	<p>Design Approval Stage</p> <p>Design Approval Stage</p> <p>Construction supervision</p>		

No.	EIA Ref.	Activity	Mitigation/EIA Recommendations	Responsibility for Implementation	Audit Method	Implementation Status/Date	Auditors Signature
6	Section 7	Construction:		RSS to ensure measures undertaken by Contractor	Construction supervision		
		Material Storage	Covers for dusty stockpiles				
		Vehicle movement	Haul road watering, vehicle wheel wash prior to exit. Where practical, access roads should be protected with crushed gravel.				
		Plant maintenance	All plant shall be maintained to prevent any undue air emissions.			Prior to start of construction	
		All plant activity	Reference should be made the EM&A Manual Action Plan for measures for consideration when Noise Limit Levels are not met.			Prior to start of construction	
		Plant maintenance	All plant shall be maintained to prevent any undue noise nuisance.				
		Wheel wash	All wheel wash water shall be diverted to a sediment pit.				
		Concrete Truck Washout	All concrete trucks shall wash out into a lined pit.				
		Surface water diversion	All clean surface water shall be diverted around the site.				
		Sediment control	Sediment removal facilities shall provided and be maintained and excavated as necessary to prevent sedimentation of the channel. Perimeter channels should be provided. Works should programmed for the dry season where feasible.				
		Fuel can storage	All fuel cans shall be placed within a bunded area. Any fuel spills shall be mopped up as necessary.				
		Slope covers	Finished slopes and other slopes near drainage areas shall be covered prior to rains to reduce sedimentation of runoff. Slopes should be hydroseeded or shotcreted as early as possible to prevent erosion.				
		Excavation works	Excavation works shall avoid sensitive areas.				
		Material, plant movement and fuel can refilling.	Any fuel or oil spills shall be excavated and disposed of.				



No.	EIA Ref.	Activity	Mitigation/EIA Recommendations	Responsibility for Implementation	Audit Method	Implementation Status/Date	Auditors Signature
		Generators	All generators shall be placed within a bunded area. Any fuel spills shall be mopped up as necessary.				
		Material containers	All empty bags and containers shall be collected for disposal.				
		Worker generated litter and Waste	Litter receptacles shall be placed around the site. Litter shall be taken regularly to the refuse collection points. Chemical toilets (or suitable equivalent) should be provided for workers. Any canteens should have greasetraps.				
		Neighborhood nuisance	All complaints regarding construction works shall be relayed to the environmental team.				
		Legal requirements	Different types of waste should be segregated, stored, transported and disposed of in accordance with the relevant legislative requirements and guidelines				
		On-site separation	On-site separation of municipal solid waste and construction/demolition wastes should be conducted as far as possible in order to minimize the amount of solid waste to be disposed to landfill.				
		Temporary storage area	Separated wastes should be stored in different containers, skips, or stockpiles to enhance reuse or recycling of materials and encourage their proper disposal.				
		Record of wastes	Records of quantities of wastes generated, recycled and disposed (with locations) should be properly kept.				
		Trip-ticket system	To monitor the disposal of waste at landfills and control fly-tipping, a "trip-ticket" system for all solid waste transfer/disposal operations should be implemented. The system should be included as a contractual requirement, and monitored by the Environmental Team and audited by the Independent Checker (Environment).				

No.	EIA Ref.	Activity	Mitigation/EIA Recommendations	Responsibility for Implementation	Audit Method	Implementation Status/Date	Auditors Signature
		Water quality	<p>Provision of perimeter channels to intercept storm runoff from the site. These should be constructed in advance of site formation works and earthworks.</p> <p>Sediment removal facilities such as sand traps, silt traps and sediment basins should be provided to remove particles from runoff. These facilities should be properly maintained.</p> <p>Programming of the works to minimise soil excavation works during rainy season.</p> <p>Exposed soil and slope surfaces should be protected by shotcrete or hydroseeding as soon as possible to reduce the potential for soil erosion.</p> <p>Temporary access roads should be protected by crushed gravel.</p> <p>Trench excavation should be avoided in the wet season and if this is unavoidable then these should be excavated and backfilled in short sections.</p> <p>Open stockpiles of construction materials and tunnel spoil should be covered with tarpaulin during rainstorms.</p> <p>Septic tanks and chemical toilets should be provided for the work force. Grease traps should be provided for wastewater generated from canteens.</p> <p>Drainage serving an open oil filling point should be connected to storm drains via a petrol interceptor.</p> <p>Vehicle and plant servicing areas, vehicle wash bays, and lubrication bays should be located within roofed areas and the drainage in these areas should be connected to foul sewers via a petrol interceptor.</p> <p>Wheel wash should be provided at site exits and washwater should be reused as far as possible. Washwater should be disposed of in storm drains via a silt trap.</p>				

No.	EIA Ref.	Activity	Mitigation/EIA Recommendations	Responsibility for Implementation	Audit Method	Implementation Status/Date	Auditors Signature
7	Section 8	Monitoring and Audit	To be carried out in accordance with the Schedule in the EM and A Manual	HyD*/Contractor/RSS	Environmental Workers Checker	N/A	
8	Section 9	Risk Assessment	<p>Construction cranes and piling rigs and any use of explosives to be controlled to avoid accidental collapse or projection onto the Shell mounded facility which is close to Sai Tso Wan Road.</p> <p>It will be necessary to provide procedures and event action plans to cover rapid cessation of construction activities.</p> <p>The design of Route 9 in the vicinity of the terminals to avoid or minimise factors likely to contribute to collision such as sudden speed reduction or queuing.</p> <p>Emergency escape provision and emergency vehicles access to be provided.</p> <p>Placement of concrete BLEVE wall could be considered after evaluation of cost implications and design and construction constraints.</p>	<p>The future Contractor will be responsible for controlling the construction activities under the monitoring of the Engineer for the contract. HyD will include such requirement in the contract.</p> <p>During the detailed design stage of the Route 9 project, HyD will work out the procedures and event action plans in consultation with the concerned parties including TD, the Police, FSD, EMSD and oil terminal operators.</p> <p>The future Contractor will be responsible for implementing the procedures and event action plans under the monitoring of the Engineer for the contract. HyD will include such requirement in the contract.</p> <p>During the detailed design stage of the Route 9 project, HyD will work out such details in consultation with TD and the Police.</p> <p>During the detailed design stage of the Route 9 project, HyD will work out such details in consultation with the concerned parties including TD, the Police &amp; FSD.</p> <p>During the detailed design stage of the Route 9 project, HyD will investigate in detail whether or not the concrete BLEVE wall should be provided and the extent of such provision, if necessary.</p>			

No.	EIA Ref.	Activity	Mitigation/EIA Recommendations	Responsibility for Implementation	Audit Method	Implementation Status/Date	Auditors Signature
			A traffic study of the Shell and Caltex terminals exits, Sai Tso Wan Road and the Sai Tso Wan Road and Tsing Yi Road junction, to determine whether traffic flows at the depot exits need to be improved to reduce risks and due LPG tanker movements, should be considered.	During the detailed design stage of Route 9 project, HyD will carry out the traffic study in consultation with concerned parties including TD and the Police. HyD is responsible for implementing any recommendation or improvement measures resulting from the traffic study.			
			<p>The detailed design of Route 9 should incorporate features which would allow it to be closed and cleared quickly in case of emergency.</p> <p>In case of a major accident at an oil terminal, suitable liaison should be established between FSD, the oil terminals and Route 9 Control Room.</p>	<p>During the detailed design stage of the Route 9 project, HyD will work out and incorporate the features in consultation with the concerned parties including TD, Police, FSD, EMSD and the PHI operators.</p> <p>During the detailed stage of the Route 9 project, HyD will work out the emergency response plans in consultation with the concerned parties including Security Bureau, TD, Police, FSD, EMSD and the oil terminal operators. The plan shall include traffic management measures to close Route 9 quickly in case of emergency.</p> <p>TD will undertake, with the assistance of the Route 9 operator and the Police, the implementation of traffic management measures to facilitate the rescue actions and the minimise inconvenience caused to the public.</p>		Prior to operation	

\* Normally undertaken by a specialist monitoring team employed directly by the proponent and audited by the Environmental Works Checker.

\*\* Chainage and approximate grid reference for barrier locations

Road Link	Chainage		Grid Reference		Type
	Start	Finish	Start	Finish	
R9 Road Link NB	NA	Interface with Route 16	E832.590 N821.150	Interface with Route 16	3 m barrier
R9 Road Link SB (eastern side of carriageway)	0+493	Interface with Route 16	E832.942 N821.355	Interface with Route 16	3m barrier
Ramp G	7+500	8+015	E832.943 N821.354	E833.420 N821.152	3m barrier
Route 9/CT9 Slip Road (Section 1)	0+600	0+450	E829.033 N822.211	E829.960 N822.362	5m barrier + 2m cantilever
Route 9/CT9 Slip Road (Section 2)	0+370	0+290	E829.088 N822.441	E829.138 N822.500	5m barrier + 2m cantilever

## **APPENDIX**

### **Responses to comment**

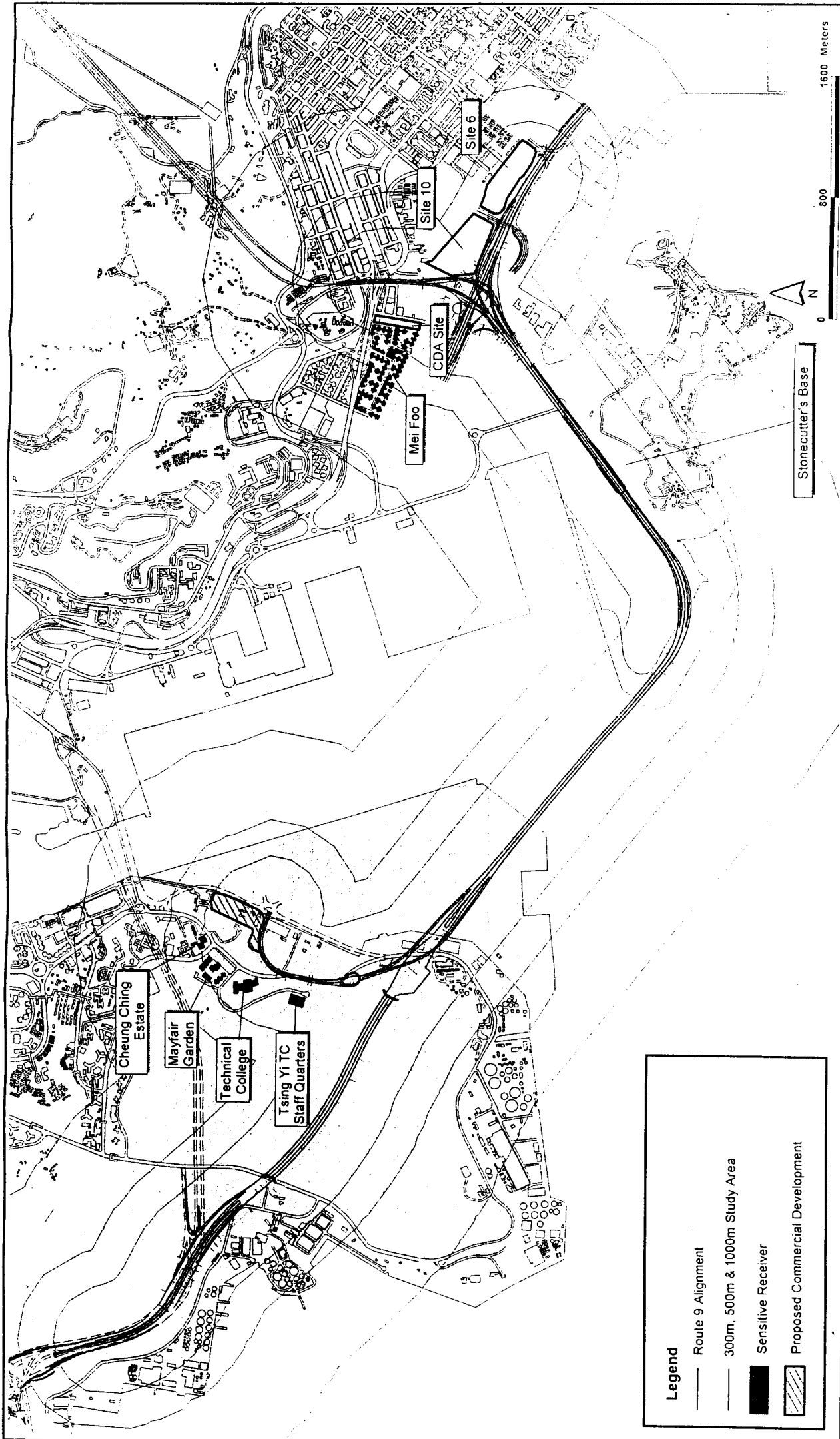
Concerned Party	Comment	Response/ Actions have been taken
Environmental Protection Department ref. (29) in An (1) in EP2/N3/A/28 Pt.2 dated 7 May 1999 EM&AM	Section 3.7.1 Delete the 2 <sup>nd</sup> sentence (the purpose is to avoid confusion as the recommended construction noise mitigation measures shall be incorporated in the Action Plan).	Agreed.
	Section 3.8 Add <i>"The details of noise monitoring shall be subject to the detailed monitoring plan deposited to the Director of Environmental Protection as per Section 8 of the Environmental Monitoring and Auditing Manual"</i> .	Agreed.
	Section 5 and 9 Include the same mitigation measures as for Section 7.9 of the EIA Report.	Reference made to the schedule of Section 10.

Concerned Party	Comment	Response/ Actions have been taken
	<p>Section 8.1.1</p> <p>(i) Delete "Mei Foo Sun Chun" in the 2<sup>nd</sup> sentence.</p> <p>(ii) Amend the last sentence as:  <i>"The Project Proponent shall deposit with the Director of Environmental Protection (the Director), at least 6 months before the operation of the project, a monitoring plan to be undertaken for the purpose of assessing the accuracy of traffic noise predictions by comparing the project noise impact predictions with the actual impacts. The monitoring plan shall contain monitoring locations, monitoring schedules, methodology of noise monitoring including noise measurement procedures, traffic counts and speed checks, and methodology of comparison with the predicted levels. Three sets of measurements (each 30 mins) at middle and upper levels during periods of peak traffic flow on normal weekdays shall be conducted at each measurement location. Monitoring shall be conducted in accordance with the deposited monitoring plan unless changes have been justified to the Director. Monitoring details and results including the comparison between the measured noise levels and the predicted levels shall be recorded in a report to be deposited with the Director within one month of the completion of the monitoring. The report shall be certified by the Project Proponent before submission to the Director."</i></p>	<p>Agreed and amended in Chapter 9.1.1.1.</p> <p>Agreed and amended in Chapter 9.1.1.2.</p>



Concerned Party	Comment	Response/ Actions have been taken
	<p>Section 9 Item 1 Replace "subject to detailed design" by "the location, outline design and materials of the proposed mitigation measures shall be referenced to Figures 2.1, 2.2 and 2.3. Any subsequent changes to the proposed mitigation measures shall be subject to re-submission according to the EIAC requirements/procedures" and provide plan(s) of at least 1:2000 to show the chainage of the recommended noise barriers.</p> <p>Item 3 Add "tunnel discharges should be connected to oil interceptors prior to discharging to the stormdrains" in Item No. 3 under "Mitigation/EIA Recommendations".</p> <p>Item 6 (i) Add the recommended construction noise mitigation measures as incorporated in the Action Plan for Construction Noise. (ii) Include those mitigation measure as listed in Section 7.7.5 of the EIA.</p>	<p>Agreed.</p> <p>Agreed.</p> <p>Agreed.</p> <p>Agreed.</p>

## **FIGURES**



**Legend**

- Route 9 Alignment
- 300m, 500m & 1000m Study Area
- Sensitive Receiver
- ▨ Proposed Commercial Development



**Highways Department**

**Route 9  
Between Tsing Yi and Cheung Sha Wan  
Detailed Feasibility Study**

**安建顧問公司  
Atkins China Ltd**  
a member of the WS Atkins group of companies



Title

**Study Area and Sensitive Receivers**

Scale

Date **Aug 1998**

Figure No. **1.1**

Figure 2.1 : Data Sheet for TSP Monitoring

Monitoring Location	
Details of Location	
Sampler Identification	
Date & Time of Sampling	
Elapsed-time	Start (min.)
Meter Reading	Stop (min.)
Total Sampling Time (min.)	
Weather Conditions	
Site Conditions	
Initial Flow Rate, Qsi	Pi (mmHg)
	Ti (°C)
	Hi (in.)
	Qsi (Std. m <sup>3</sup> )
Final Flow Rate, Qsf	Pf (mmHg)
	Tf (°C)
	Hf (in.)
	Qsf (Std. m <sup>3</sup> )
Average Flow Rate (Std. M <sup>3</sup> )	
Total Volume (Std. m <sup>3</sup> )	
Filter Identification No.	
Initial Wt. of Filter (g)	
Final Wt. of Filter (g)	
Measured TSP Level (µg/m <sup>3</sup> )	

	<u>Name &amp; Designation</u>	<u>Signature</u>	<u>Date</u>
Field Operator	:	_____	_____
Laboratory Staff	:	_____	_____
Checked by	:	_____	_____

**Figure 3.1 : Noise Monitoring Field Record Sheet**

Monitoring Location	
Description of Location	
Date of Monitoring	
Measurement Start Time	(hh:mm)
Measurement Time Length	(min.)
Noise Meter Model/Identification	
Calibrator Model/Identification	
Measurement Results	L <sub>90</sub> (dB(A))
	L <sub>10</sub> (dB(A))
	Leq (dB(A))
Major Construction Noise Source(s) During Monitoring	
Other Noise Source(s) During Monitoring	
Remarks	

	<u>Name &amp; Designation</u>	<u>Signature</u>	<u>Date</u>
Recorded By :	_____	_____	_____
Checked by :	_____	_____	_____

**Figure 7.1 : Sample Template for Interim Notifications of Environmental Quality Limits Exceedances**

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

Location Plan

Prepared by : \_\_\_\_\_  
 Designation : \_\_\_\_\_  
 Signature : \_\_\_\_\_  
 Date : \_\_\_\_\_

